NTSB Motorcycle Safety Public Forum

Motorcycle Airbags

Jay Joseph
American Honda Motor Co., Inc.
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Washington D.C.

Honda Strategic Safety Vision

Reduced Injuries & Fatalities

Prevention

Avoidance

Mitigation

Intelligent Highway

Inter-Vehicle communications

Roadway Design

Airbag

ASV-3

Improved Tires

Advanced Braking Systems:
ABS, CBS, & ABS + CBS

Helmets

Protective clothing

Improved Lighting

Training & Retraining

Education

Safety Awareness

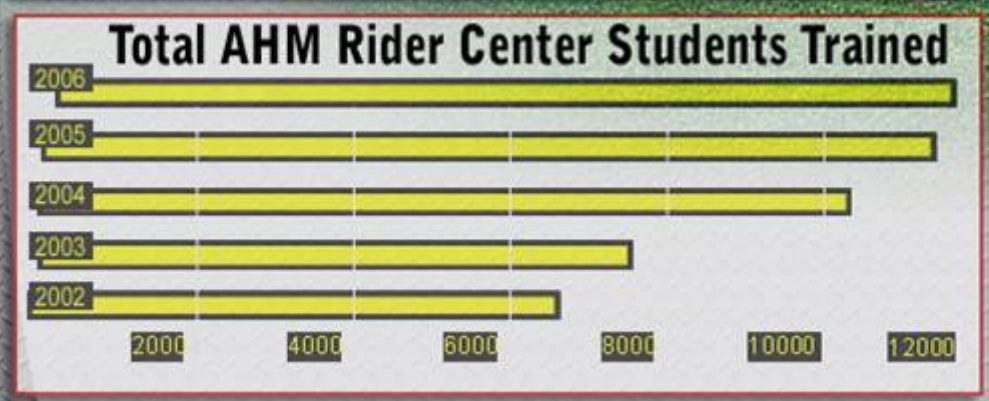
Rider Impairment

Licensing

“Promoting the safe and responsible use of Honda’s PowerSports Products”

RIDER EDUCATION CENTER
HONDA

Honda Traffic Safety Simulator Project



Tires, Headlamps, Advanced Brakes

For better detection

F acial
A ttention for
C onspicuity
E nhancement

Frontal design looks like human face.

For better perception of distance and velocity

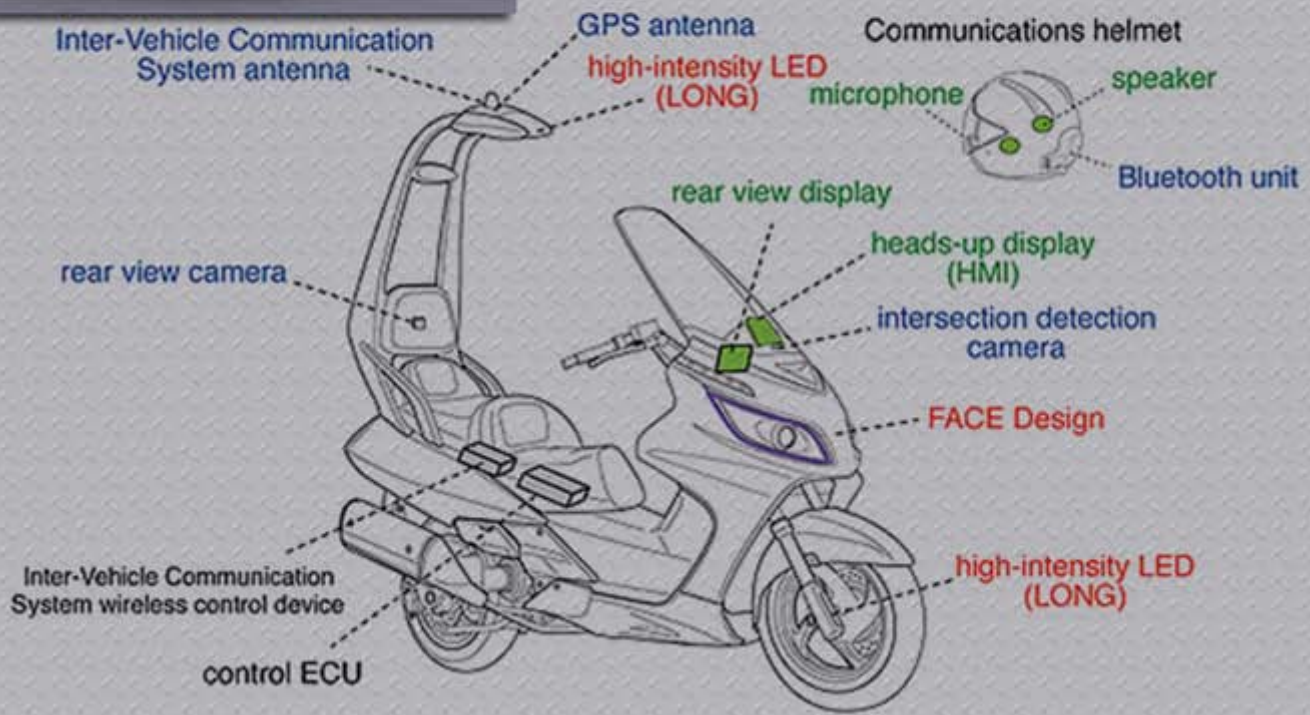
L ongitudinal
O riented
N ormative temporal
G ap compensate

LED lights are located at two different heights

http://world.honda.com

Infrastructure, Intelligent Highway, Inter-Vehicle Communications

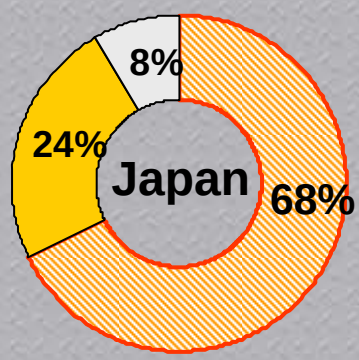
Interaction between Motorcycle and Car Research: Communication system between vehicles – ASV-3-Technology

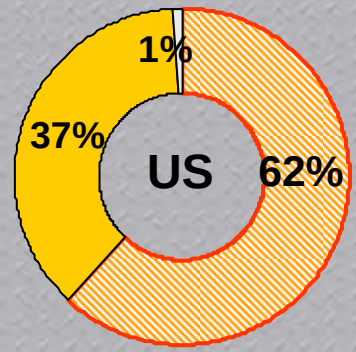


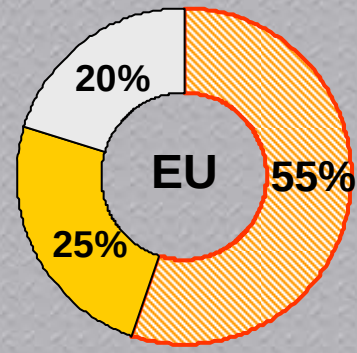
Motorcycle Accident Data Analysis

Type of Motorcycle Accidents Causing Fatalities or Injuries

- Frontal Collisions
- Other Collisions
- Non-collision (falls, etc)

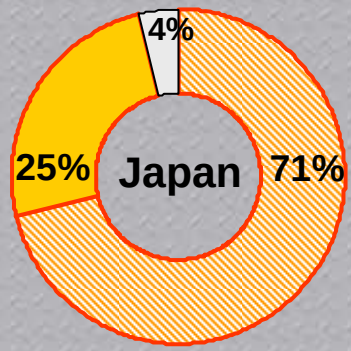


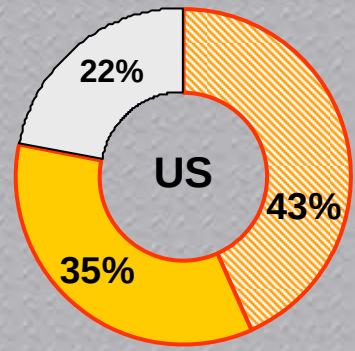


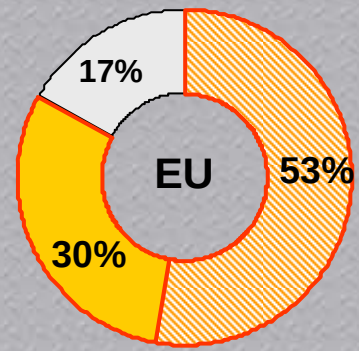


Causes of Rider Injuries in Motorcycle Accidents

- Impact with Road, Obstacles
- Impact with Automobiles
- Other Causes







Source: ITARDA

Source: U.S.D.O.T.

Source: MAIDS

Motorcycle Airbag System Concept

- **In Frontal collisions:**
- **Absorbing rider's kinetic energy, reducing rider separation velocity on Motorcycle**

- **Mitigating the rider's injuries of the impact to opposing vehicles and fixed objects**

Passive Safety: Reduction of injury risks

1987 Acura Legend

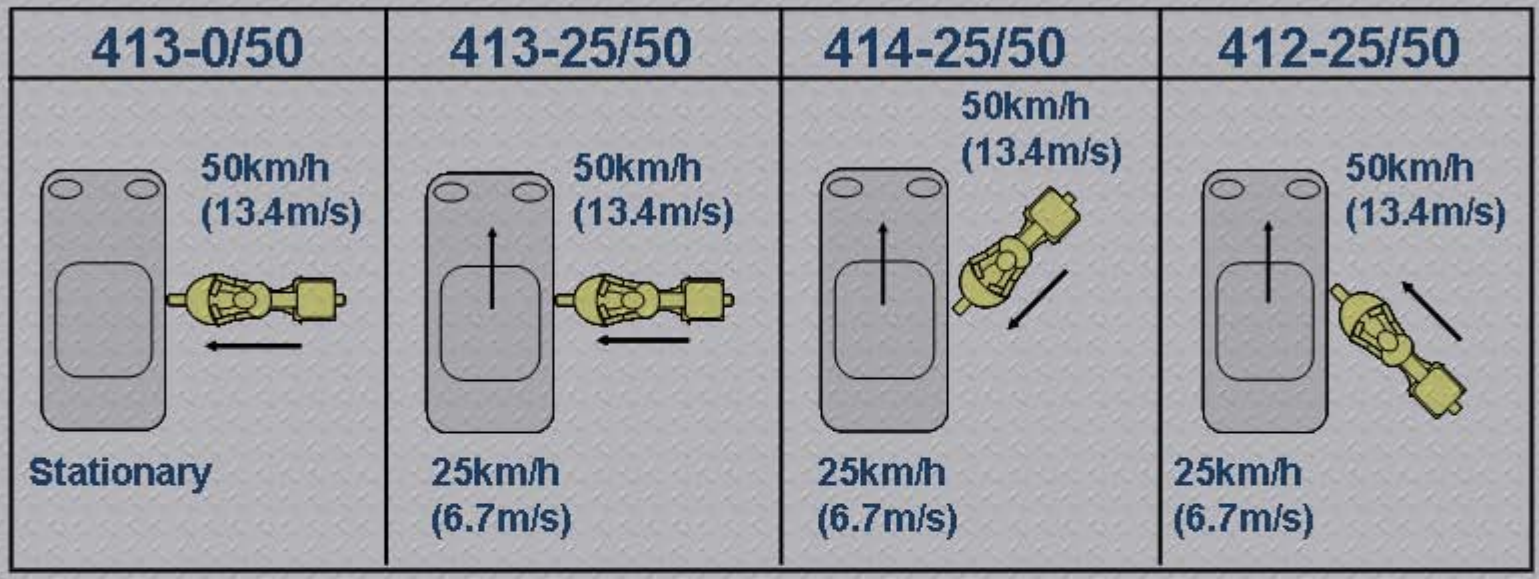
2006 Gold Wing

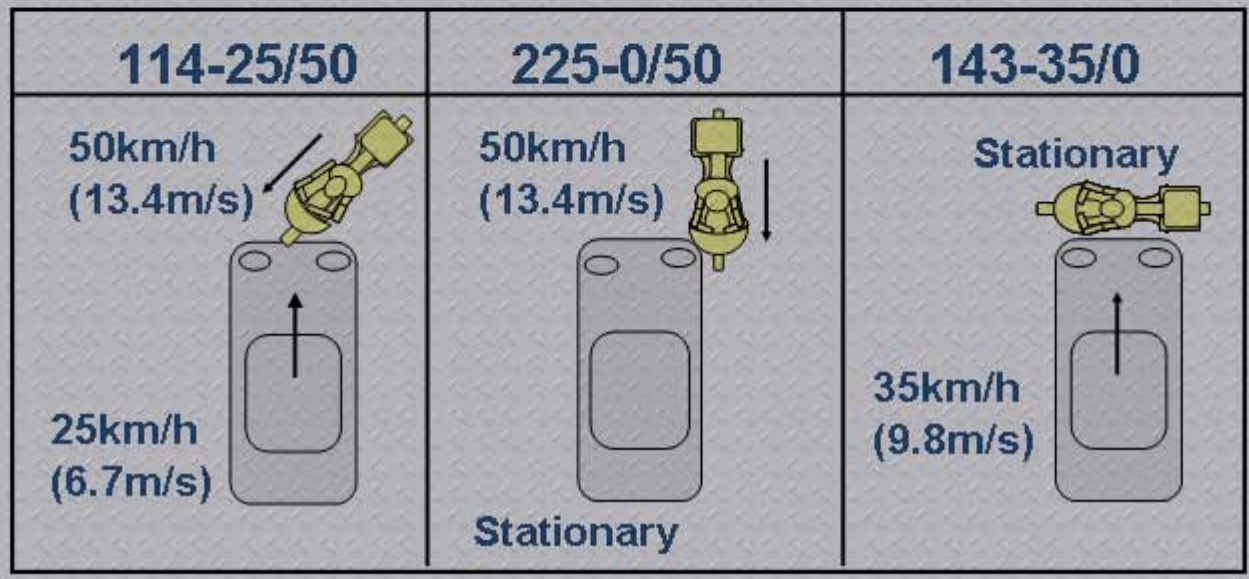
Honda's first production automobile airbag system was applied in 1987. Honda's research & development for a motorcycle airbag system benefited from our automobile research and knowledge but, the motorcycle presents unique challenges that required extensive additional research & development.

Development History

	Research & Development History	Major presentations in technical conferences	
1990			
	Fundamental Research ・ Airbag size, shape and securing method, etc		
1996	・ Computer Simulation development	[15th ESV conference *Established ISO 13232]*	
1997	(multi-body type software)		
1998	**Operational Vehicle/ Full System Research** (based on Gold Wing touring bike (1500cc))	16th ESV conference	
1999		JSAE Spring Session	
2000		MLIT Smart Cruise Demo 2000 (ASV-2)	
2001		17th ESV conference	
2002	**Research with other Models** (large scooter)		
2003		2003 SETC (US)	
2004		2004 IFZ conference (Germany)	
2005	**Completion of Airbag System for 1800cc Gold Wing**	19th ESV conference	

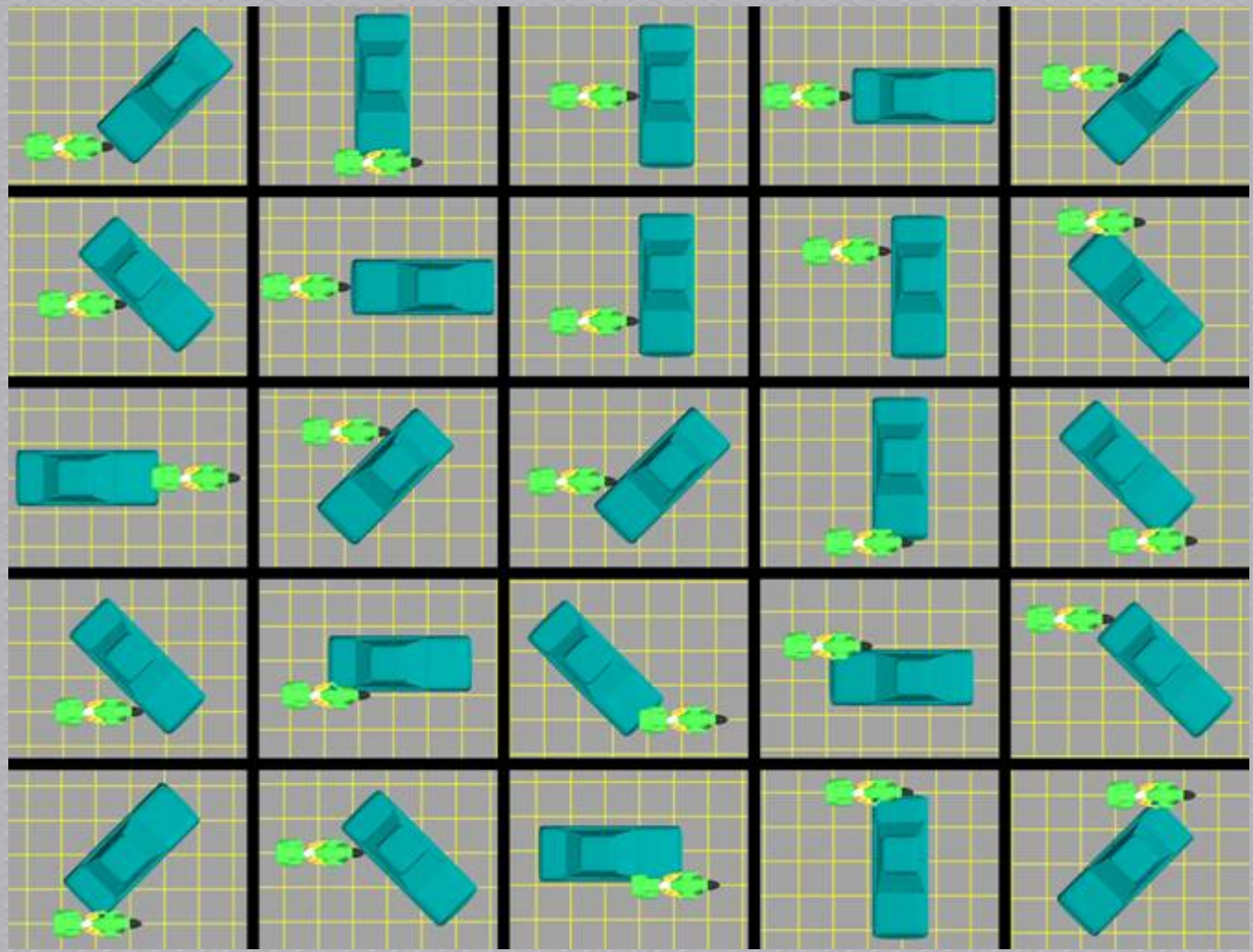
ISO 13232 Full Scale Tests – 7 test configurations





ISO 13232 computer simulations

- 200 simulations based on 25 Crash Configurations at different speeds – with and without airbag



Investigation methodology Required Unique Motorcycle Dummy

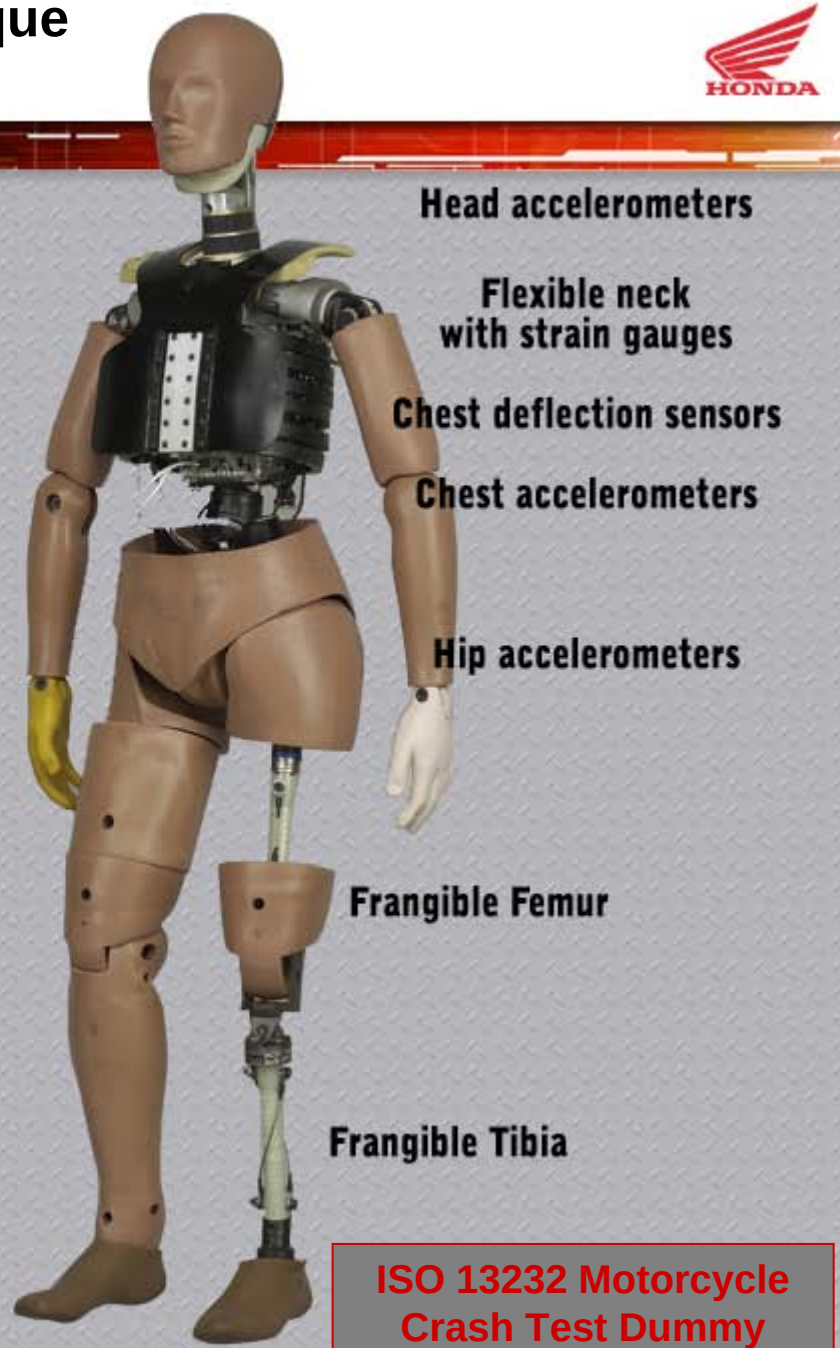
< ISO 13232 >

Motorcycles – Test and analysis procedures for research evaluation of rider crash protective devices fitted to motorcycles

With following definitions

- **Crash configurations for analysis based on accident investigation**
- **Motorcycle Crash Test Dummy**
- **Data measurement**
- **Injury Analysis**
- **Full Scale Test**
- **Computer Simulation**

This guideline for objective risk/benefit analysis was developed as a tool for research and development



ISO 13232 Motorcycle Crash Test Dummy

Why the Gold Wing?

Fuel Tank Location

Upright rider position

Long Wheelbase, low Cg provide space and less pitch rotation


Airbag Module
Airbag ECU
Crash Sensors
Upper Sensor
Lower Sensor

System Operational Flow

Side collision with a stationary vehicle (Honda Accord) at 50km/h

Impact begins — **0**

Collision recognized

- **Inflator activated**
- **Inflation gas released**
- **Lid opened**
- **Airbag inflated**

approx. 0.015sec.
(15/1000sec.)

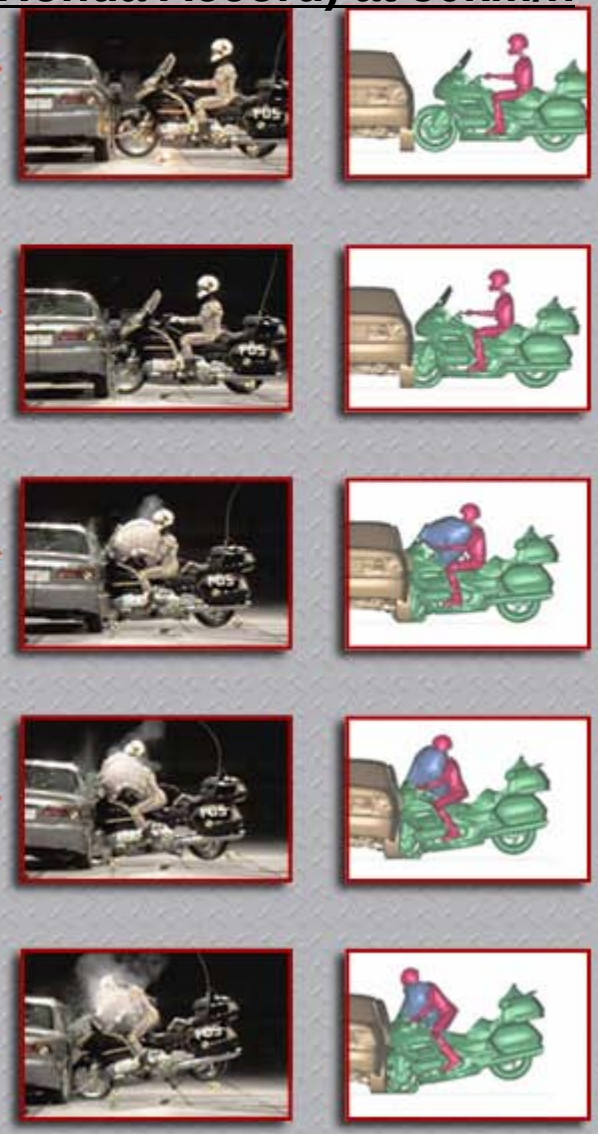
Airbag deployment

approx. 0.06sec.
(60/1000sec.)

- **Rider's kinetic energy absorbed by airbag**
- **Deflation via vents**

approx. 0.15sec.
(150/1000sec.)

Rider's kinetic energy absorption finishes



ISO Computer Simulations with and without Airbag

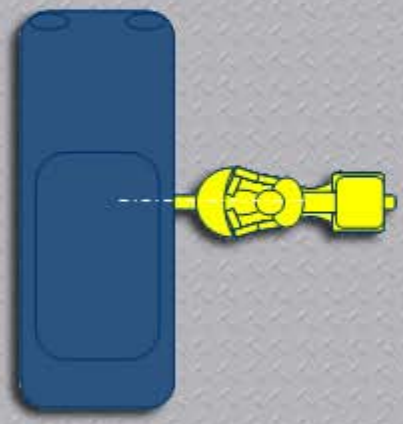
Click Here to Launch Video

Passive Safety: CAE technology

Click Here to Launch Video

Passive Safety: Reduction of injury risks

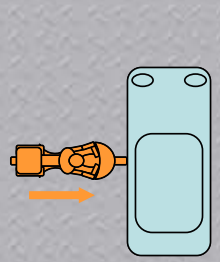
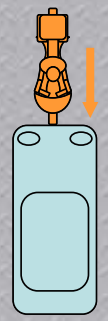
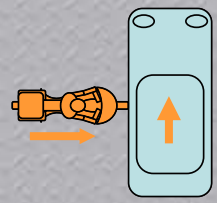
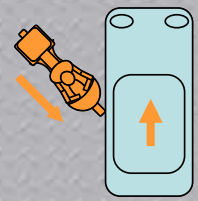
50 km/h Full Scale Crash Test



stationary
OV

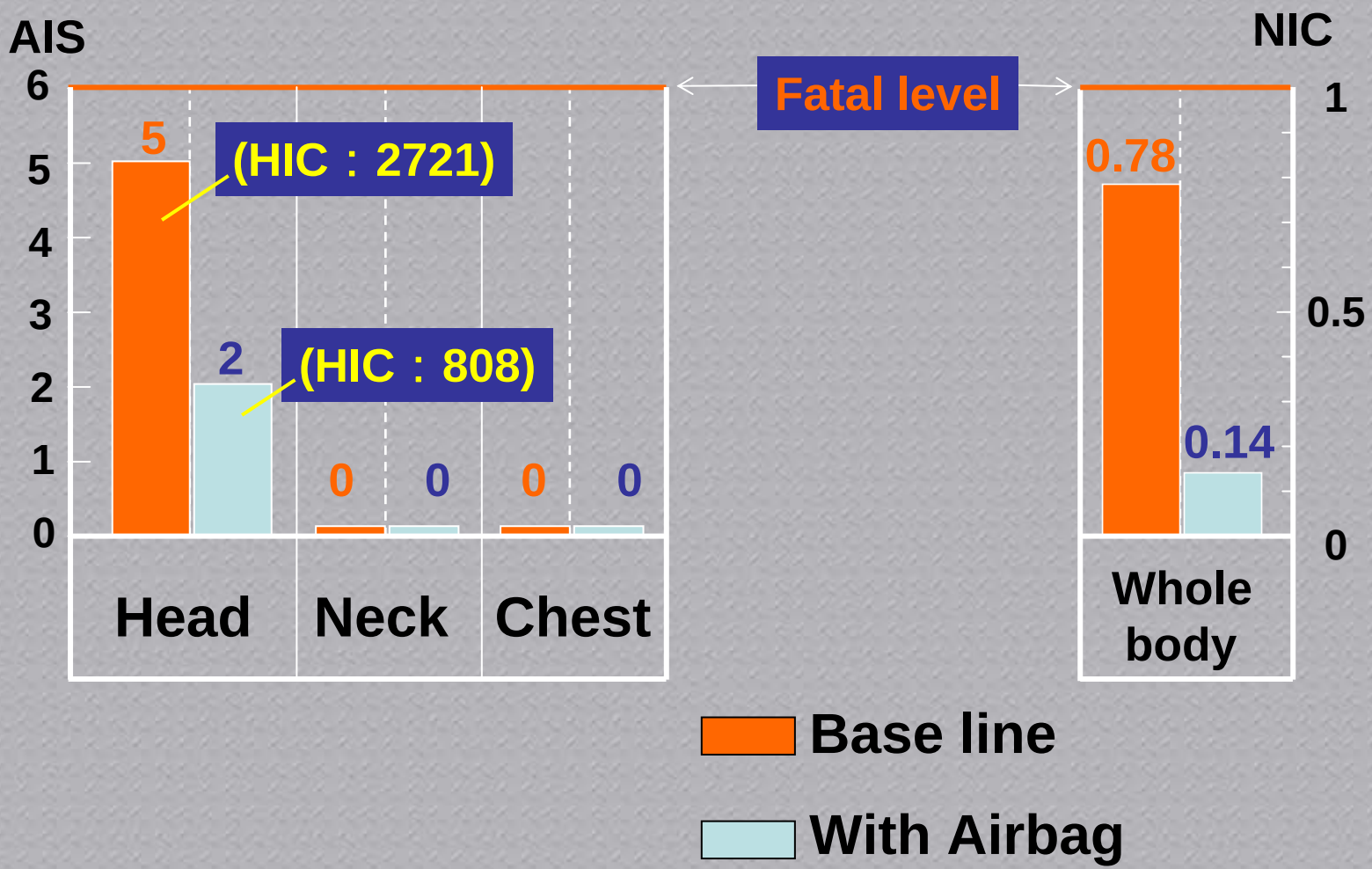
Click Here to Launch Video

System Effectiveness

		side crash	frontal crash	side crash	angled crash
Test configurations					
velocity	Motorcycle	50km/h	50km/h	50km/h	50km/h
	automobile	stationary	stationary	25km/h	25km/h
 Honda Goldwing with Airbag		effective	effective	effective	effective
		* Absorbs all of rider's forward kinetic energy		* Absorbs most of rider's forward kinetic energy	
		* no rider (dummy) contact to other vehicle			

Confirmation Test of Airbag Effectiveness in High Speed Impact

Result of injury evaluation



Rider Position Comparison And Out of Position Occupants

Gold Wing - Tourer

Cruiser

Sport Bike

Scooter

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Conclusion

- The motorcycle airbag has a limited but important role – to help reduce injury severity in some frontal collisions by absorbing energy and slowing the rider's velocity.
- In-use collision data must be analyzed to obtain real world benefits
- Application of airbag systems to other types and models of motorcycles will require extensive research & development
- Automobiles airbags are still advancing through industry efforts after more than 20 years of use. Some conditions still rely on disabling airbags. The concept of motorcycle airbags requires time and experience to advance.